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Semper Paratus in the 21st Century

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Business as usual will mean going out of business. Will vessels like the one shown in this notional depiction of a multimission cutter from Coast Guard files be in the Coast Guard's future?

Cold, wet, tired, and clinging to a life ring, you wonder, "Twelve hours ago I sent a mayday message. Six hours ago I saw a Coast Guard plane fly overhead; four hours ago I saw a helicopter only a few miles away; two hours ago I saw a cutter on the horizon. The United States can read license plates from space halfway around the world and can track people moving inside a building in Peru from a plane more than 30,000 feet up... why can't they find an orange-clad, splashing taxpayer in distress just 100 miles off the coast?"

As the nation heads into the 21st century, it will need the Coast Guard's Deepwater services more than ever. Will the Coast Guard be ready to answer the call? Demand for traditional Deepwater (more than 50 miles from the coast) Coast Guard missions, such as maritime safety, maritime law enforcement, and marine environmental protection, is projected to increase over the next 20 years. [1] Demand for Coast Guard deployments in national defense roles also is likely to increase. Growing gaps in asset availability and capability, however, undermine the service's ability to respond to these demands. A substantial recapitalization effort is needed to mold an Integrated Deepwater System ready to serve the nation.

The most obvious problem facing today's and tomorrow's operational commanders is simply the availability of assets—or rather, the lack thereof. There are not enough airplanes, helicopters, and cutters to go around. Given the crisis-level operations tempo of the first half of the 1990s, entire operational areas and missions have been neglected. Mission demand has grown significantly over the past 50 years, but the number of assets has declined. There were 93 Deepwater cutters in 1950, 66 in 1970, and 49 in 1987. Today, there are 43, and within a year the average cutter age will be higher than ever before. Attrition and the lack of any new Deepwater ship construction projects clearly portend further widening this gap.

The capability gaps are more insidious but every bit as damaging. The most painful gaps are in the area of command, control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR). The Coast Guard's current assets suffer from a chronic and degenerative case of sensory deprivation.

Mission-analysis work conducted by the Coast Guard Office of Operations found that detection, classification, identification, and prosecution of targets are the four primary functions required to conduct nearly all Deepwater missions.[2] A quick look through *Combat Fleets of the World* (Naval Institute Press, 1995) reveals that the offshore patrol vessels (OPVs), corvettes, and frigates of the world's coast guards and navies have capabilities including navigation radar, surface-search radar, air-search radar, and fire-control radar. Many have sonar, electronic surveillance capability, infrared sensors, and near-real-time data-communications capability to download "the picture" from off-board sensors.

Inverse synthetic aperture radars, as well as passive-surveillance equipment integrated with intelligence data and information technology systems, allow targets to be "profiled" or even identified by name at ranges of 24 miles or more with on-board sensors. Integration with off-board sensors allows identification of targets nearly anywhere in the world. Yet no Coast Guard cutter has sonar or an imaging radar, and only the *Hamilton* (WHEC-715) class has an air-search radar. The *Hamilton* and *Bear* (WMEC901)

classes have a fire-control radar but it suffers from reliability and availability problems and is used only sparingly. The *Reliance* (WMEC-615) class has only an antiquated surface-search radar.

A recent mission-effectiveness study showed that in typical fisheries patrols, from *Bear*-class cutters, fishing vessels more than 60 feet in length are typically detected at 18,100 yards, classified at 12,500 yards, and identified at 2,100 yards. Detection was accomplished by radar, classification by eyeball, and identification by radio and eyeball.[3] One can only imagine the ranges for smaller targets or those actively trying to avoid detection.

The sensory deprivation is not only external. The Coast Guard's own unit-problem detection and self-health monitoring systems also are outdated or nonexistent. While much of the world rapidly is moving toward condition-based maintenance, unmanned machinery spaces, and autonomic damage-control systems, the Coast Guard still relies on an operating hours-based preventative maintenance system, manual hourly rounds with a pen and clipboard, and manned fire parties as the first response to any fire in the main machinery spaces.

While others use data links to upload and download pictures and video to and from deployed aircraft, other task units, and the operational commander, Coast Guard units often struggle to decipher voice reports from air and surface units just beyond the horizon. Even if the communications flow rate and clarity improved, the command, control, and computer systems still are ill-equipped to handle the information. The Navy is working toward deploying a personal computer-based information technology system (IT-21) by the year 2000. It will be used to conduct tactical business, such as sharing operational pictures, browsing intelligence products, and planning collaboratively, as well as nontactical business such as logistics, personnel training, medical, and supply. It will be supported by backbones at multiple levels. Local-area networks (LANs) will connect personal computers (PCs) for all ship and shore commands. Metropolitan-area networks (MANs) will connect all commands within geographic fleet concentration areas. Wide-area networks (WANs) using satellite communications will connect afloat battle groups, amphibious ready groups, and forces ashore.[4] Cooperative engagement capability will allow targets to be composite tracked and engaged, using remote data by networked units otherwise unable to detect, classify, or identify them.[5] The Coast Guard is working toward having a few Windows-based PCs on board every ship by 2000. A limited LAN will service only the most basic non-tactical business.

Prosecution includes many requirements, but primarily a target must be intercepted and a Coast Guard presence put on board. Among other things, this requires speed and an effective boat launch-and-recovery system. The rest of the world's ships typically run at 23 to 30-plus knots. Other fleets have successfully integrated stern launch and recovery systems or modern constant-tension hoisting systems, improving safety and performance while reducing the crew required. Only the Hamilton-class ships are capable of more than 20 knots, but fuel consumption concerns and frequent gas turbine and red-gear problems limit the use of such high speeds. Coast Guard cutter boat launch-and-recovery systems are in many cases the original equipment from the 1960s or 1970s and placed on board as space would allow, once the uptakes, helicopter hangar, passageways, and other systems were locked into the design.

Aircraft are used extensively for all of the four primary functions described above. Other services have equipped aircraft with modern sensors and data-communications packages and incorporated automated helicopter launch, recovery, firefighting, and flight-deck-traversing systems. The Coast Guard still relies primarily on the eyeball and UHF or VHF voice communications. It has automated the primary tie-down procedure but removed no people from launch and recovery operations.

The Coast Guard long has worked hard to plug—or narrow—the availability and capability gaps. Two major overhaul programs and myriad single-system or focused upgrade projects have been effected. The *Hamilton*-class fleet rehabilitation and modernization (FRAM) of the late 1980s successfully brought many of the C4ISR systems from the 1960s into the 1980s. The major maintenance availability (MMA)

program is attempting to extend the service life of the *Reliance*-class cutters. The propulsion plant was overhauled, the electric plant updated, and the overall material condition much improved.

Unfortunately, these efforts could not stave off the march of time and obsolescence, given today's rapid and broad technological advancements. In both cases, much of the propulsion, electrical, and mechanical systems are still the technology—if not the original equipment—installed in the 1960s. Little was done to upgrade the *Reliance*-class C4ISR systems; the last ship will leave MMA with the same radar they first entered with ten years ago. The personal computer industry has gone through six distinct generations—each an order of magnitude more powerful than the last—in the time it has taken to refurbish this class of 16 small ships. Considering the information, computing, and sensor technology explosion of the past ten years, it is not hard to see that many of the "newer" *Hamilton*-class C4ISR systems are again obsolete.

Based on *Combat Fleets of the World*, the Coast Guard fleet of high- and medium-endurance cutters includes vessels that date back to 1965. Certainly, the cutters have aged gracefully, their very age a tribute to their design, quality construction, professional operations, and meticulous maintenance. However, delivered back to the fleet, a "refurbished" *Reliance*-class cutter still is one of the slowest, poorest-equipped ships of its kind in the world.

To implement the new technologies properly and prosper from the synergistic nature of their integration into a common package, a complete redesign is required. Further, the design must allow—even foster—continuous improvement of all components.

Increasingly, the value of a ship, or an aircraft for that matter, is not determined by its displacement, complement, payload weight, or stand-alone capabilities, but by the volume of information it can collect, transmit, and act on and its ability to leverage the capabilities of the assets around it. In building the *Arleigh Burke* (DDG-51)-class destroyer, for example, a shipyard receives only about a third of the $900 million average cost. The bulk of the funding goes for the C4ISR, weapons, mobility, and other equipment and systems that provide the ship its true capabilities.[6]

Following this new paradigm, the U.S. Navy is aggressively planning for the future through projects like LPD-17, SC-21, CVX, and the Joint Strike Fighter. The Coast Guard is playing catch up. For fiscal year 1998, $5 million has been appropriated for concept exploration. Yet, 99% of the Navy's surface combatant fleet has been commissioned since 1973, while 70% of the Coast Guard's deepwater fleet was commissioned before 1973.

Reengineering and replacing the Coast Guard's Deepwater system of assets will not be inexpensive, at least in terms of acquisition dollars. Indeed, rough estimates point to the need for $7 to $12 billion dollars over the next 15 to 20 years. This will require nearly doubling the current annual acquisition, construction, and improvement budget of approximately $375 million for the duration of this time period. In today's budget environment, asking for an increase of this magnitude would seem to be a non-starter. However, there are a number of powerful arguments and forces at work to support this recapitalization project.

The problem must be correctly phrased. The question should be, "Will the nation require the services of the U.S. Coast Guard in the 21st century?" The question should not be, "Can the service afford to recapitalize?" If the answer to the first question is yes, the Coast Guard cannot afford *not* to reengineer and recapitalize its deepwater service. Piecemeal upgrades will cost hundreds of millions, if not billions, of dollars. FRAM and MMA alone, for example, cost over $1 billion over the past decade.[7] Maintenance and repair costs will increase disproportionately as major systems are pushed well beyond their intended service life and parts and technical support become scarce. And personnel costs will force the retiring of personnelintensive aircraft and vessels. Large and well-trained crews have helped the service overcome some of its capability gaps, but this makes cutters much more expensive to operate than newer, more automated ships.

Industrial base capacity issues have created a period of opportunity for the Coast Guard to recapitalize. The shipbuilding industry, in particular, is seeking new business opportunities in the wake of sharply reduced Navy ship construction contracts. Without new customers, one or more of the nation's six largest

yards is likely to merge, downsize, or disappear altogether by 2005. Around that time, the Navy hopes to revitalize its ship construction activity with projects such as SC-21 and CV-X. Thus, the shipbuilding industry offers a buyer's market for the next decade or so. Beyond that, it is difficult to predict what is in store for the industry or its customers.

More than ever, the Navy—and the nation—needs the Coast Guard to assist with low-threat sea control and harbor defense missions as well as low-intensity operations other than war. Indeed, Coast Guard cutters may be more appropriate than Navy vessels in some cases for the maritime diplomacy role of peacetime engagement. Most of the world's navies have missions more in common with the U.S. Coast Guard than the U.S. Navy. A recent study noted, "The Navy should be keenly interested in the national defense capabilities of the future cutter fleet… there seem to be many opportunities for cutters to make… useful contributions diplomatically as well as militarily. If the military fleets of the nation are viewed jointly, it seems only natural that the low end of a high-low mix—or at least some portion of the low end—should be in the Coast Guard."[5]

Finally, Congress and the people of the United States should support a renewal of the Coast Guard's deepwater inventory. Numerous recent operational successes in all of its mission areas have amply demonstrated the Coast Guard's value to the nation. Preserving life at sea, preventing mass influxes of illegal immigrants, stopping the flow of drugs, and protecting the nation's fisheries and the maritime environment are well-understood, much-appreciated, and growing business lines. What Congress and the people may not know is the cost at which the services are provided and the deteriorating availability and capability of the assets that provide these services.

Personnel-intensive ships that are capable of only 17-to 19-knot top speeds and equipped with outdated C4ISR systems will not be technologically, economically, or operationally competitive much longer. Similarly, aircraft effectively censored by a lack of technology rather than sensored with the latest technology will also cease being useful. In short, business as usual for the Coast Guard means going out of business. If new assets and new operational concepts are not employed, the Coast Guard will go the way of wooden ships, sailing ships, radarless ships, and battleships. Rehabilitating existing assets or converting Navy vessels may provide a short-term solution, but it will not be cost effective in the long term. For the Coast Guard to remain the world's premiere maritime service in the 21st century, the entire inventory of assets must be rethought. An integrated deepwater system of systems must be designed and deployed to take advantage of current and emerging technologies.

1 Coast Guard Office of Operations, "Deepwater Mission Analysis Report," 6 November 1995.
2 Office of Operations.
3 Naval Undersea Warfare Center, "USCG Deepwater Mission Effectiveness Domain validation Report," 30 September 1996, pp. 2-8.
4 Archie Clemens, "IT-21: Moving to the Third Stage," U.S. Naval Institute *Proceedings,* May 1997, pp. 51-54.
5 Michael J. O'Driscoll and Jerry A. Krill, "Cooperatlve Engagement Capability," *Naval Engineers Journal*. March 1997, pp. 43-57.
6 Robert Holzer, "Aerospace Firma Chase Ship Work," *Defense News,* vol. 12, no. 13, March 31-April 6, 1996, pp. 3 and 35.
7 Office of Operations.
8 O. Kim Malmin et al., "Future Coast Guard Cutter Study: Final Report," Center for Naval Analyses, November 1996, p. 2.

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